

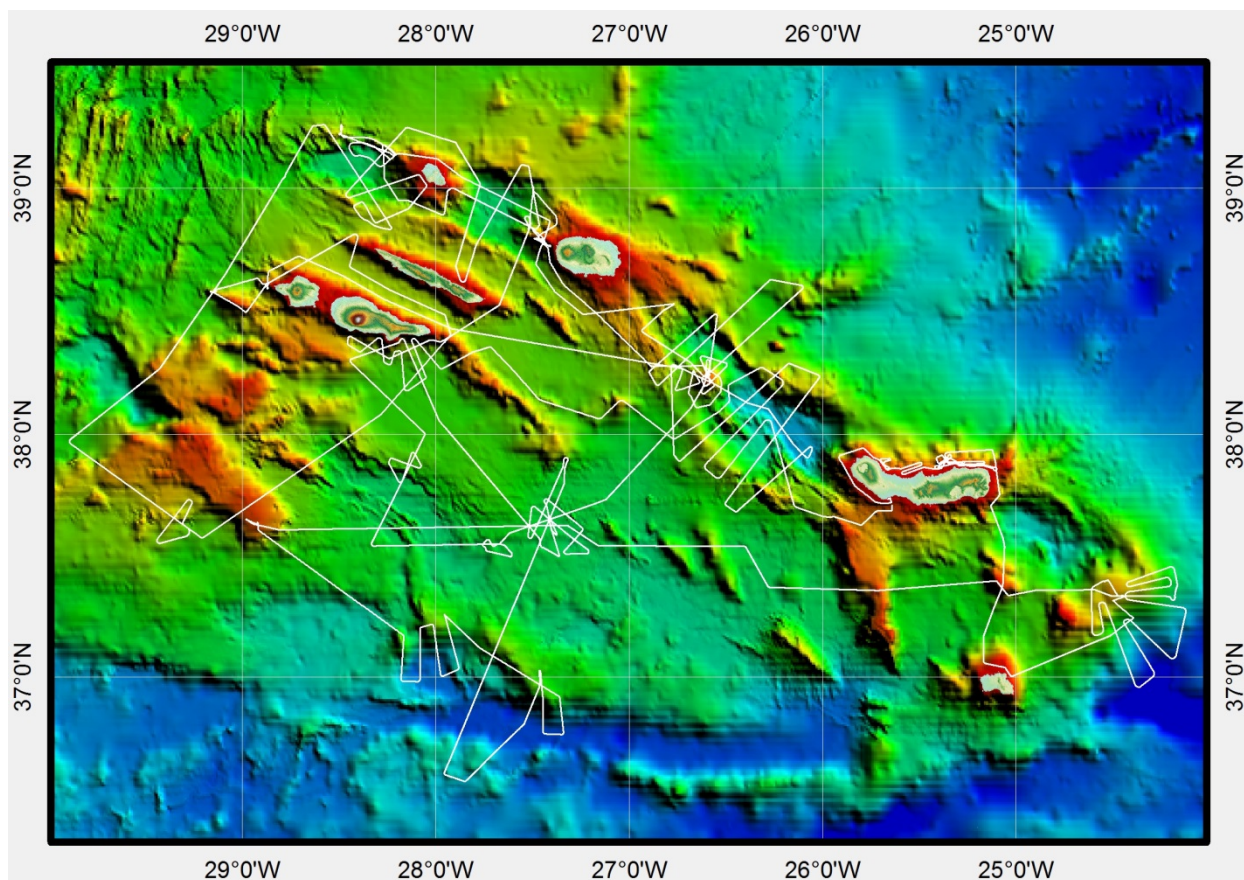


Universität Hamburg  
DER FORSCHUNG | DER LEHRE | DER BILDUNG



Prof. Dr. Christian Hübscher  
CEN - Center for Earth System Research and Sustainability  
Institute of Geophysics  
University of Hamburg  
Bundesstrasse 55  
20146 Hamburg / Germany  
Tel. +49-40-42838 5184  
Email: christian.huebscher@zmaw.de

**Short Cruise Report**  
**R/V METEOR – M113**  
**Ponta Delgada – Ponta Delgada**  
**December 29, 2014 – January 22, 2015**  
**Chief Scientist: Christian Hübscher**  
**Captain: Michael Schneider**



## Objectives

Oceanic plateaus are large areas of anomalously thick crust forming large bathymetric swells in the ocean basins and their petrological formation and subsequent sedimentological evolution is only poorly understood. The reason for the magmatic and volcanic activity that built the igneous part of the Azores Plateau is debated. As in other places of the world deep, hot mantle plumes are believed to cause the magmatism due to their high excess temperature. According to an alternative model volcanism is explained by excess melting of the mantle due to an elevated volatile content. In addition, the structural evolution of the plateau and the relationship between rifting and volcanism is a matter of active scientific debate. It is suggested that an oblique spreading axis jumped incrementally from the East Azores Fracture Zone towards the north-east. The Terceira rift axis along the northern border of the Plateau represents the present stage and the recent plate boundary between the Eurasian and African plates. In addition, recurrence rate, trigger mechanisms, volumes, and transport processes of large scale mass wasting events are amongst the scientific questions targeted.

R/V Meteor expedition M113 aimed at the geophysical, geochemical and petrological evolution of both the deeper, older sites on the plateau and the younger eruption sites in the vicinity of the Terceira axis. The geophysical program (multi-beam, parametric sediment echosounding and reflection seismics) was designed to test the following hypotheses:

- Explosive volcanism is the prevailing eruption mechanism in the submarine Azores volcanic cones.
- Volcanic cone evolution is independent of water depth.
- Locations of submarine volcanoes are related to shallow tectonic faults reflecting the plate-tectonic evolution of the Azores Plateau.
- Hydrothermal activity is associated with volcanic cones.

Rock sampling was carried out at few older and several young submarine volcanic eruption sites which have not been studied in detail yet. The following working hypotheses will be tested by petrological and geochemical analysis of the recovered samples:

- Explosive submarine volcanism is primarily caused by abundant volatile compounds and not by magma-water interaction.
- Volcanism becomes younger west of the respective islands implying that most islands move away from their sources of melting.
- The 1998 Terceira eruption formed submarine lava fountains.
- Eruptions near the João de Castro seamount occur dominantly in the main volcanic edifice but also occur in the two rift zones N and NE of the volcanic system.

Multi-beam and seismic data will provide the crucial site-survey data for ROV sampling during a forthcoming research cruise and the tectono-volcanic structural framework for the interpretation of the samples. The micro- and nano-plastic concentration within the surface water will be measured by geochemical analyses of water sampled during the cruise.

The multichannel seismic equipment comprised four seismic sources and a 600 m long digital streamer. The set of hydro-acoustic systems includes the hull mounted EM122 multi-beam and parametric sediment subbottom profiler system *Parasound*. Rock sampling was carried out by means of a wax corer and a TV-grabber.

All together, we collected 89 multi-channel seismic profiles with a summed length of 3500 km. TV-grabber and wax corer was used at 29 stations. Hydroacoustic data were collected along the entire ship track (5700 km).

## Cruise Narrative

The M113 scientific party arrived at Ponta Delgada on Sunday (December 28<sup>th</sup>) and boarded the vessel in the early evening. Most of the deck installations were done two weeks before in Catania/Sicily, but there was still lot of work to do in the labs, which was completed way after midnight.

Monday December 29<sup>th</sup>. RV Meteor left Ponta Delgada harbour at 10am and reached the open sea just a few minutes later, where a strong southerly wind was accompanied by rough seas. Due to the harsh weather conditions a hydroacoustic and high-resolution reflection seismic survey was carried out along the northern shelf of São Miguel. These data are required to investigate the offshore prolongation and dynamics of a fault system reported in earlier studies. We further intended to link the more than 50 km long channels on the northern submarine slope of São Miguel with gullies that incise into the north-eastern flank of Sao Miguel's volcanoes. Seismic measurements stopped on Tuesday 30<sup>th</sup> in the morning at the north-eastern corner of São Miguel. The first half of the day was used to test the digital streamer: after this we made a fast transit to the south-eastern rim of São Miguel and deployed the digital streamer and four seismic sources. A long seismic transect crossing structural highs and the northern flank of Santa Maria island will allow to investigate the relative age relationships between the volcanic and magmatic edifices. These measurements lasted until the next early morning. Wednesday 31<sup>st</sup> was dedicated to TV grab sampling of four different volcanic cones that emerge as small parasitic cones from a larger igneous edifice. The TV grab allows a careful and thorough selection of the sampling sites by monitoring the seafloor with a video system. The samples revealed a variety of both sedimentary and igneous rock types. The TV grab was on deck before dinner and we started a hydroacoustic survey of the evolving seamounts during the night of New Year's Eve.

The hydroacoustic survey finished Thursday January 1<sup>st</sup> 2015 in the morning and we deployed the seismic gear. The following continuous east-west profile crossed several magmatic highs. This profile which was continued on Friday 2<sup>nd</sup> was designed to unravel the relative age relationship between these elevated features. Data revealed evidence for several igneous intrusions into the sediment succession which overlies the basaltic basement. Seismic profiling ceased Saturday 3<sup>rd</sup> on the south-eastern end of Princess Alice Bank at 14:00 after having crossed a paleo-rift in the southern archipelago. A single TV grab station was lowered at Princess Alice Bank and the rocks samples reveal mostly coral fragments and carbonates. During the night to Sunday 4<sup>th</sup> we surveyed the East Azores Fracture Zone with multi-beam, and these data will be used for detailed ROV surveys during a later cruise. Two reflection seismic profiles towards and across the East Azores Fracture Zone started Sunday evening. During that survey we discovered circular dome-like features that are a few hundred meters high and which are surrounded by distinct seafloor depressions. In the past these features were known as "fried eggs" and interpreted as impact structures, however, coordinates were never published. On Monday 5<sup>th</sup> we commenced a detailed study of the circular edifices in the central archipelago. After retrieval of the seismic gear next morning (Tuesday 6<sup>th</sup>) TV grab stations were designated to sample sediments both from top and the surrounding depression of the fried egg features. In the evening we started the seismic measurements again in order to survey the transition from the eastern to the western, more elevated, archipelago which was continued on Wednesday 7<sup>th</sup>. Off the coast of Pico we imaged a debris avalanche deposit off the southern slope of the island. Geophysical profiling on Thursday 8<sup>th</sup> was dedicated to study the evolution of the paleo-rift that was crossed already on January 3<sup>rd</sup>. Afterwards we shot several profiles along a north bound coursed across the archipelago. The seismic program on Friday 9<sup>th</sup> included profiles across the central Terceira Rift which were designed to elucidate its volcano-tectonic evolution between Terceira Island and João de Castro. We interrupted geophysical surveying on Saturday 10<sup>th</sup> on top of João de Castro. We deployed RV METEOR's jetty named METEORIT which was equipped with depth sonar. The dinghy surveyed a track across the summit which we intended to cruise along with the seismics later. At noon seismic commenced and we successfully performed the measurements. Next day (Sunday 11<sup>th</sup>) we did more seismic profiling between João de Castro and Terceira across the active rift which lasted until Monday 12<sup>th</sup>. Seismic profiling ceased around noon and TV grab

sampling northwest of Terceira started along the Serreta ridge. The sampling here was extremely successful and resulted in numerous samples. This station work was continued during the night to Tuesday 13<sup>th</sup> after midnight. Hydroacoustic profiling started in order to map and identify possible locations for the next TV grab stations northwest of Graciosa. The TV grab and one volcanic wax corer station showed that the volcanism in this area is extremely young. In the later evening we continued with seismic profiling. The first profiles were designed to image mass transport deposits around Graciosa. Seismic profiles measured on Wednesday 14<sup>th</sup> will help to understand the Terceira rift basin between Terceira and Graciosa and the profiles measured on Thursday 15<sup>th</sup> most part of the Terceira Rift west of Graciosa. We investigated the western most side of the Azores Plateau Friday 16<sup>th</sup> with a 160 km long profile that crossed the western ends of the several rift systems which cut across the entire western archipelago. Seismic data collected on Saturday 17<sup>th</sup> from the south-western corner of the plateau unravelled the tectonic deformation of Princess Alice Bank. We continued seismic measurements perpendicular to the structural trend east of the magmatic ridges that are situated parallel to Terceira/Graciosa, São Jorge and Pico. A seismic profile measured on Sunday 18<sup>th</sup> through the Pico-São Jorge channel brought us to the working area west of Faial where rock sampling by means of TV grabs and wax corer was commenced extremely successfully. During the night to Monday 19<sup>th</sup> a fast transit brought us back to João de Castro where TVG sampling was resumed along to ridges that are situated northward from João de Castro and one ridge that may be connected to the island of Terceira. Sampling here revealed an extremely complex geological setting. During the night to Tuesday 20<sup>th</sup> we steamed towards western Terceira. TV sampling was carried out west of Terceira until 07:00 in the morning in an attempt to sample the igneous portion of the rift system. The seismic gear was deployed and we started a survey from west of Faial to south-eastern Pico. Seismic profiling on Wednesday 21<sup>st</sup> was carried out along the southern slope of Pico in order to determine the trigger mechanisms for submarine mass wasting. Seismic measurements stopped at 11:00 and all gear was put on deck. We started a hydroacoustic survey towards São Miguel. All scientific measurements were finished at 06:00 of Thursday 22<sup>nd</sup>. We arrived at the Pier of Ponta Delgada at 09:00 where the cruise ended successfully.

## Acknowledgements

We are thankful to all authorities and scientists who helped to reach the research permission, like the foreign office in Berlin, the German embassy in Lisbon and the Control Station German Research Vessels in Hamburg. The cruise was financed by German Research Foundation (DFG). We would like to specially acknowledge the master of the vessel Michael Schneider, and his crew for their continued contribution to a pleasant and professional atmosphere aboard R/V METEOR.

## Cruise Participants

1	Christian Hübscher	Chief Scientist	CEN-IfG
2	Benedikt Weiß	Senior Scientist	CEN-IfG
3	Pedro Terrinha	Observer	IPMA
4	Luis Batista	Observer	IPMA
5	Sandro Spitzzy	Biogeochemistry	GPI-HH
6	Paraskevi Nomikou	Volcanology	UA-GC
7	Anthony Hildenbrand	Volcanology	GEOPS
8	Christoph Beier	Petrology, Geochemistry	GZN-FAU
9	Bernd Schleifer	Petrology, Geochemistry	GZN-FAU
10	Christoph Weinzierl	Petrology, Geochemistry	GZN-FAU
11	Muayyad Al-Hseinat	Geophysics	CEN-IfG
12	Marie Blum	Geophysics	CEN-IfG
13	Martina Bobsin	Geophysics	CEN-IfG
14	Laura Frahm	Geophysics	CEN-IfG
15	Henrik Grob	Geophysics	CEN-IfG
16	Claudia Kalvelage	Geophysics	CEN-IfG
17	Janina Kammann	Geophysics	CEN-IfG
18	Katharina Knevels	Geophysics	CEN-IfG
19	Isidoros Levanos	Geophysics	UA-DTAG
20	Henning Reichel	Geophysics	CEN-IfG
21	Franziska Petry	Geophysics	CEN-IfG
22	Dela Spickermann	Geophysics	CEN-IfG
23	Fine Stackemann	Geophysics	CEN-IfG
24	Sjard Stratmann	Geophysics	CEN-IfG
25	Martin Vögele	Geophysics	CEN-IfG
26	Sven Winter	Geophysics	CEN-IfG
27	Joachim Bülow	Electronic Lab	CEN-IfG
28	Tobias Schaaf	Meteorologist	DWD
29	Martin Stelzner	Technician	DWD

### CEN-IfG

Institut für Geophysik  
Universität Hamburg  
Bundesstraße 55  
20146 Hamburg / Germany

Bâtiment 504, Département des Sciences de la  
Terre  
Université Paris-Sud  
91405 Orsay cedex / France

### DWD

Deutscher Wetterdienst  
Geschäftsfeld Seeschiffahrt  
Bernhard-Nocht-Straße 76  
20359 Hamburg / Germany

### GPI

Geologisch-Paläontologisches Institut und Mu-  
seum  
Universität Hamburg  
Bundesstraße 55  
20146 Hamburg / Germany

### GEOPS

Laboratoire Géosciences Paris-Sud,  
Unité Mixte de Recherche 8148  
Centre National de la Recherche Scientifique  
(CNRS) / Université Paris-Sud (UPS)

### GZN-FAU

Geozentrum Nord  
Friedrich-Alexander Universität Erlangen-  
Nürnberg  
Schlossgarten 5

91054 Erlangen / Germany

**IPMA**

Instituto Português do Mar e da Atmosfera, IP  
Rua C – Aeroporto de Lisboa  
1749-077 Lisboa / Portugal

**UA-DTAG**

National & Kapodistrian University of Athens  
School of Science  
Faculty of Geology and Geoenvironment

Dept. of Dynamic, Tectonic and Applied Geology  
Panepistimioupolis, Zographou  
157 84 Athens / Greece

**UA-GC**

National & Kapodistrian University of Athens  
School of Science  
Faculty of Geology and Geoenvironment  
Dept. of Geography and Climatology  
Panepistimioupolis, Zographou  
157 84 Athens / Greece

## List of Profiles and Stations

### A. Seismic Profiles

Profile	Start					Ende					Length [km]
	Date	UTC	Latitude	Longitude	Station	Date	UTC	Lat	Lon	Station	
Profil01	29.12.2014	17:06:07	37°51.4	25°40.1	ME1130/ 1306-1	29.12.2014	19:00	37°52.3	25°30.0	ME1130/ 1306-1	18
Profil01	29.12.2014	19:00	37°52.3	25°30.0	ME1130/ 1306-1	29.12.2014	20:04	37°50.2	25°34.8	ME1130/ 1306-1	10
Profil01	29.12.2014	20:04	37°50.2	25°34.8	ME1130/ 1306-1	29.12.2014	21:39	37°51.3	25°25.1	ME1130/ 1306-1	15
Profil01	29.12.2014	21:39	37°51.3	25°25.1	ME1130/ 1306-1	29.12.2014	22:00:53	37°51.9	25°23.1	ME1130/ 1306-1	3
Profil01	29.12.2014	22:01:25	37°51.9	25°23.0	ME1130/ 1306-1	29.12.2014	23:03	37°54.0	25°20.7	ME1130/ 1306-1	9
Profil01	29.12.2014	23:03	37°54.0	25°20.7	ME1130/ 1306-1	30.12.2014	00:13	37°52.0	25°23.8	ME1130/ 1306-1	12
Profil01	30.12.2014	00:13	37°52.0	25°23.8	ME1130/ 1306-1	30.12.2014	02:55:49	37°51.7	25°07.7	ME1130/ 1306-1	31
Profil01	30.12.2014	02:55:49	37°51.7	25°07.7	ME1130/ 1306-1	30.12.2014	06:29:00	37°54.7	25°23.7	ME1130/ 1306-1	25
Profil01	30.12.2014	06:29:00	37°54.7	25°23.7	ME1130/ 1306-1	30.12.2014	07:38:18	37°54.1	25°20.5	ME1130/ 1306-1	11
Profil01	30.12.2014	07:38:18	37°54.1	25°20.5	ME1130/ 1306-1	30.12.2014	09:01	37°52.8	25°11.9	ME1130/ 1306-1	13
Profil11	30.12.2014	19:35:43	37°36.3	25°05.0	ME1130/ 1307-1	31.12.2014	01:45:50	37°03.9	25°10.1	ME1130/ 1307-1	62
Profil12	31.12.2014	01:45:50	37°03.9	25°10.1	ME1130/ 1308-1	31.12.2014	03:31:03	37°00.5	25°00.3	ME1130/ 1308-1	17
Profil13	31.12.2014	03:31:03	37°00.5	25°00.3	ME1130/ 1308-1	31.12.2014	07:30:18	37°09.0	24°34.9	ME1130/ 1308-1	41
Profil14	01.01.2015	16:53:20	37°20.1	24°13.7	ME1130/ 001-1	02.01.2015	01:37:20	37°23.8	25°06.1	ME1130/ 001-1	81
Profil15	02.01.2015	01:37:20	37°23.8	25°06.1	ME1130/ 001-1	02.01.2015	15:17:56	37°32.2	26°23.9	ME1130/ 001-1	126
Profil16	02.01.2015	15:17:56	37°32.2	26°23.9	ME1130/ 001-1	03.01.2015	00:17:10	37°37.5	27°19.2	ME1130/ 001-1	84
Profil17	03.01.2015	00:17:10	37°37.5	27°19.2	ME1130/ 001-1	03.01.2015	14:41:19	37°37.9	28°56.3	ME1130/ 001-1	143
Profil18	04.01.2015	16:21:13	36°57.5	27°27.9	ME1130/ 003-1	04.01.2015	21:02:23	36°39.2	27°44.3	ME1130/ 003-1	43
Profil19	05.01.2015	00:58	36°36.2	27°57.3	ME1130/ 003-1	05.01.2015	18:15:07	37°53.7	27°20.3	ME1130/ 003-1	151
Profil20	05.01.2015	18:15:07	37°53.7	27°20.3	ME1130/ 003-1	05.01.2015	22:04:59	37°35.1	27°31.4	ME1130/ 003-1	41
Profil21	05.01.2015	22:04:59	37°35.1	27°31.4	ME1130/ 003-1	06.01.2015	00:14:35	37°42.1	27°29.1	ME1130/ 003-1	15
Profil22	06.01.2015	00:14:35	37°42.1	27°29.1	ME1130/ 003-1	06.01.2015	03:56:27	37°30.6	27°13.2	ME1130/ 003-1	33
Profil23	06.01.2015	03:56:27	37°30.6	27°13.2	ME1130/ 003-1	06.01.2015	05:11:31	37°31.4	27°20.1	ME1130/ 003-1	11
Profil24	06.01.2015	05:11:31	37°31.4	27°20.1	ME1130/ 003-1	06.01.2015	06:41:15	37°37.1	27°14.8	ME1130/ 003-1	14
Profil25	06.01.2015	06:41:15	37°37.1	27°14.8	ME1130/ 003-1	06.01.2015	09:04:51	37°43.4	27°26.3	ME1130/ 003-1	23
Profil26	06.01.2015	09:05:07	37°43.4	27°26.4	ME1130/ 003-1	06.01.2015	10:30:21	37°36.5	27°24.1	ME1130/ 003-1	13

					003-1						003-1	
Profil27	06.01.2015	20:37:49	37°33.1	27°27.6	ME1130/ 005-1	07.01.2015	23:59:57	37°46.5	27°40.9	ME1130/ 005-1		32
Profil28	07.01.2015	00:00:05	37°43.4	27°26.4	ME1130/ 005-1	07.01.2015	04:22:00	38°03.1	27°58.6	ME1130/ 005-1		40
Profil29	07.01.2015	04:22:00	38°03.1	27°58.6	ME1130/ 005-1	07.01.2015	09:05:17	38°22.3	28°11.7	ME1130/ 005-1		44
Profil30	07.01.2015	09:05:17	38°22.3	28°11.7	ME1130/ 005-1	07.01.2015	11:27:01	38°18.4	28°26.1	ME1130/ 005-1		22
Profil31	07.01.2015	11:27:01	38°18.4	28°26.1	ME1130/ 005-1	07.01.2015	16:47:57	37°59.8	28°03.4	ME1130/ 005-1		49
Profil32	07.01.2015	16:47:57	37°59.8	28°03.4	ME1130/ 005-1	07.01.2015	20:14:13	37°54.1	28°13.4	ME1130/ 005-1		38
Profil33	07.01.2015	20:14:13	37°54.1	28°13.4	ME1130/ 005-1	07.01.2015	23:08:05	37°55.1	28°07.6	ME1130/ 005-1		23
Profil34	07.01.2015	23:08:05	37°55.1	28°07.6	ME1130/ 005-1	08.01.2015	03:49:01	37°33.3	28°19.8	ME1130/ 005-1		44
Profil35	08.01.2015	03:49:01	37°33.3	28°19.8	ME1130/ 005-1	08.01.2015	10:14:04	37°33.0	27°40.2	ME1130/ 005-1		59
Profil36	08.01.2015	15:08:35	37°32.5	27°42.1	ME1130/ 005-1	08.01.2015	21:15:23	37°43.9	27°07.4	ME1130/ 005-1		56
Profil37	08.01.2015	21:15:23	37°43.9	27°7.4	ME1130/ 005-1	09.01.2015	06:31:06	38°19.1	26°37.0	ME1130/ 005-1		86
Profil38	09.01.2015	06:31:06	38°19.1	26°37.0	ME1130/ 005-1	09.01.2015	07:54:18	38°16.6	26°29.9	ME1130/ 005-1		13
Profil39	09.01.2015	07:54:18	38°16.6	26°29.9	ME1130/ 005-1	09.01.2015	10:08:02	38°14.8	26°35.6	ME1130/ 005-1		20
Profil40	09.01.2015	10:08:02	38°14.8	26°35.6	ME1130/ 005-1	09.01.2015	18:08:58	38°37.6	26°16.6	ME1130/ 005-1		74
Profil41	09.01.2015	18:08:58	38°37.6	26°16.6	ME1130/ 005-1	10.01.2015	02:28:42	38°14.9	26°53.7	ME1130/ 005-1		76
Profil42	10.01.2015	02:28:42	38°14.9	26°53.7	ME1130/ 005-1	10.01.2015	06:50:18	38°29.2	26°33.8	ME1130/ 005-1		40
Profil43	10.01.2015	06:50:18	38°29.2	26°33.8	ME1130/ 005-1	10.01.2015	09:15:06	36°17.4	26°34.9	ME1130/ 005-1		23
Profil44	10.01.2015	14:35:14	38°16.2	26°36.1	ME1130/ 006-1	10.01.2015	16:34:50	38°11.8	26°33.9	ME1130/ 006-1		18
Profil45	10.01.2015	16:35:06	38°11.8	26°33.8	ME1130/ 006-1	10.01.2015	19:05:30	38°16.5	26°47.0	ME1130/ 006-1		23
Profil46	10.01.2015	19:05:30	38°16.5	26°47.0	ME1130/ 006-1	10.01.2015	23:28:10	37°54.7	26°45.9	ME1130/ 006-1		40
Profil47	10.01.2015	23:28:10	37°54.7	26°45.9	ME1130/ 006-1	11.01.2015	08:38:17	38°14.5	26°01.4	ME1130/ 006-1		42
Profil48	11.01.2015	08:38:17	38°14.5	26°01.4	ME1130/ 006-1	11.01.2015	17:15:29	38°41.1	26°26.6	ME1130/ 006-1		80
Profil49	11.01.2015	17:15:29	38°41.1	26°26.6	ME1130/ 006-1	11.01.2015	22:51:13	37°54.5	26°05.4	ME1130/ 006-1		52
Profil50	11.01.2015	22:51:13	37°54.5	26°05.4	ME1130/ 007-1	12.01.2015	04:31:37	38°12.7	26°34.5	ME1130/ 007-1		56
Profil51	12.01.2015	04:31:37	38°12.7	26°34.5	ME1130/ 007-1	12.01.2015	05:01:13	38°14.4	26°37.1	ME1130/ 007-1		5
Profil52	12.01.2015	05:01:21	38°14.4	26°37.1	ME1130/ 007-1	12.01.2015	08:17:21	38°24.9	26°55.8	ME1130/ 007-1		34
Profil53	12.01.2015	08:17:21	38°24.9	26°55.8	ME1130/ 007-1	12.01.2015	09:40:41	38°30.3	26°49.5	ME1130/ 007-1		13
Profil54	13.01.2015	22:10:01	39°09.3	28°16.3	ME1130/ 019-1	14.01.2015	03:03:20	38°53.6	27°58.1	ME1130/ 019-1		45
Profil55	14.01.2015	03:03:20	38°53.6	27°58.1	ME1130/ 019-1	14.01.2015	04:24:56	38°59.9	27°55.4	ME1130/ 019-1		13



					019-1					019-1	
Profil56	14.01.2015	04:24:56	38°59.9	27°55.4	ME1130/ 019-1	14.01.2015	08:52:13	38°51.2	27°28.0	ME1130/ 019-1	45
Profil57	14.01.2015	08:52:13	38°51.2	27°28.0	ME1130/ 019-1	14.01.2015	11:58:39	39°05.1	27°33.9	ME1130/ 019-1	30
Profil58	14.01.2015	11:58:39	39°05.1	27°33.9	ME1130/ 019-1	14.01.2015	18:31:00	38°41.2	27°53.7	ME1130/ 019-1	67
Profil59	14.01.2015	18:31:07	38°41.2	27°53.7	ME1130/ 019-1	14.01.2015	22:21:07	39°01.3	27°46.4	ME1130/ 019-1	39
Profil60	14.01.2015	22:21:17	39°01.3	27°46.4	ME1130/ 019-1	15.01.2015	00:26:37	39°10.8	27°53.8	ME1130/ 019-1	20
Profil61	15.01.2015	00:26:37	39°10.8	27°53.8	ME1130/ 019-1	15.01.2015	02:56:17	39°14.4	28°09.4	ME1130/ 019-1	24
Profil62	15.01.2015	02:56:17	39°14.4	28°09.4	ME1130/ 019-1	15.01.2015	07:11:06	39°57.7	28°26.6	ME1130/ 019-1	42
Profil63	15.01.2015	07:11:06	39°57.7	28°26.6	ME1130/ 019-1	15.01.2015	11:02:46	39°00.1	28°03.0	ME1130/ 019-1	39
Profil64	15.01.2015	11:02:46	39°00.1	28°03.0	ME1130/ 019-167	15.01.2015	13:47:26	38°51.7	28°18.0	ME1130/ 019-1	27
Profil65	15.01.2015	18:17:15	39°51.4	28°14.5	ME1130/ 019-1	16.01.2015	00:23:59	39°14.7	28°38.4	ME1130/ 019-1	59
Profil66	16.01.2015	00:24:03	39°14.7	28°38.4	ME1130/ 019-1	16.01.2015	13:23:46	38°15.9	28°25.8	ME1130/ 019-1	129
Profil67	16.01.2015	13:23:46	38°15.9	28°25.8	ME1130/ 019-1	16.01.2015	18:42:35	37°57.6	29°53.1	ME1130/ 019-1	53
Profil68	16.01.2015	18:42:35	37°57.6	29°53.0	ME1130/ 019-1	17.01.2015	03:12:34	37°34.5	29°26.1	ME1130/ 019-1	86
Profil69	17.01.2015	03:12:34	37°34.5	29°26.1	ME1130/ 019-1	17.01.2015	06:49:54	37°37.5	29°17.9	ME1130/ 019-1	36
Profil70	17.01.2015	06:49:54	37°37.5	29°17.9	ME1130/ 019-1	17.01.2015	07:52:42	37°34.7	29°11.9	ME1130/ 019-1	11
Profil71	17.01.2015	07:52:42	37°34.7	29°11.9	ME1130/ 019-1	17.01.2015	17:38:26	38°05.1	28°16.7	ME1130/ 019-1	98
Profil72	17.01.2015	17:38:26	38°05.1	28°16.7	ME1130/ 019-1	17.01.2015	23:17:54	38°29.4	27°57.7	ME1130/ 019-1	57
Profil73	17.01.2015	23:17:54	38°29.4	27°57.7	ME1130/ 019-1	18.01.2015	04:12:58	38°41.4	28°26.6	ME1130/ 019-1	48
Profil74	18.01.2015	04:12:58	38°41.4	28°26.6	ME1130/ 019-1	18.01.2015	05:46:18	38°48.7	28°25.6	ME1130/ 019-1	16
Profil75	18.01.2015	05:46:18	38°48.7	28°25.6	ME1130/ 019-1	18.01.2015	11:34:02	38°30.3	28°58.2	ME1130/ 019-1	59
Profil76	20.01.2015	10:19:31	38°52.3	27°30.8	ME1130/ 032-1	20.01.2015	18:05:45	38°23.0	28°02.0	ME1130/ 032-1	72
Profil77	20.01.2015	18:05:45	38°23.0	28°02.0	ME1130/ 032-1	20.01.2015	20:07:45	38°18.7	28°14.8	ME1130/ 032-1	20
Profil78	20.01.2015	20:07:45	38°18.7	28°14.8	ME1130/ 032-1	20.01.2015	22:34:01	38°21.8	28°27.0	ME1130/ 032-1	24
Profil79	20.01.2015	22:34:09	38°21.8	28°27.0	ME1130/ 032-1	20.01.2015	23:17:31	38°20.5	28°22.8	ME1130/ 032-1	7
Profil80	20.01.2015	23:17:31	38°20.5	28°22.8	ME1130/ 032-1	21.01.2015	00:25:53	38°22.9	28°16.7	ME1130/ 032-1	12
Profil81	21.01.2015	00:25:53	38°22.9	28°16.7	ME1130/ 032-1	21.01.2015	01:30:25	38°17.5	28°15.6	ME1130/ 032-1	10
Profil82	21.01.2015	01:30:25	38°17.5	28°15.6	ME1130/ 032-1	21.01.2015	01:50:57	38°17.5	28°13.7	ME1130/ 032-1	33
Profil83	21.01.2015	01:50:57	38°17.5	28°13.7	ME1130/ 032-1	21.01.2015	02:24:33	38°20.3	28°12.3	ME1130/ 032-1	56
Profil84	21.01.2015	02:24:33	38°20.3	28°12.3	ME1130/	21.01.2015	02:42:33	38°20.0	28°10.6	ME1130/	3

					032-1					032-1	
Profil85	21.01.2015	02:42:33	38°20.0	28°10.6	ME1130/ 032-1	21.01.2015	04:41:29	38°11.154	28°07.7	ME1130/ 032-1	20
Profil86	21.01.2015	04:41:29	38°11.154	28°07.7	ME1130/ 032-1	21.01.2015	05:35:53	38°14.2	28°03.1	ME1130/ 032-1	9
Profil87	21.01.2015	05:35:53	38°14.2	28°03.1	ME1130/ 032-1	21.01.2015	07:33:21	38°23.2	28°06.2	ME1130/ 032-1	20
Profil88	21.01.2015	07:33:21	38°23.2	28°06.2	ME1130/ 032-1	21.01.2015	09:24:09	38°16.1	27°57.8	ME1130/ 032-1	18
Profil89	21.01.2015	09:24:17	38°16.1	27°57.8	ME1130/ 032-1	21.01.2015	10:52:49	38°20.0	27°48.9	ME1130/ 032-1	15

## B. Sediment Sampling

Station No.		Date	Gear	Time	Latitude	Longitude	Water Depth	Remarks/Recovery
METEOR		2014/2015		[UTC]	[°N]	[°W]	[m]	
	1309	31.12.2014	TVG	11:10	37°14.698	24°23.707	1888	Four tries, three fails, finally grab closing but falling to the side, battery empty
	1310	31.12.2014	TVG	13:53	37°18.979	24°29.998	629	nor working, less suspension in water than at 1309 TVG
	1311	31.12.2014	TVG	15:43	37°20.318	24°26.956	181	no soft sedimentary cover at all
	1312	31.12.2014	TVG	18:45	37°23.728	24°32.534	745	two unsuccessful grabs, final grab seemed empty but finally turned out to have samples
	002 (new year – new numbers)	03.01.2015	TVG	17:38	37°38.114	28°55.283	368	two unsuccessful grabs, no signal from or to grab
	004	06.01.2015	TVG	15:35	37°39.215	27°25.042	2331	three unsuccessful grabs, after retrieving grab loss of large amounts of hydraulic oil. Five terraces observed at western flank each of which is about ten meters high and covered with dark, brownish rock
	008	12.1.2015	TVG	15:51	38°47.066	27°26.989	277	lava flows, numerous scoria pieces with glass fragments
	009	12.1.2015	TVG	16:46	38°47.070	27°26.975	270	hyaloclastic deposits, very young including numerous basaltic clasts
	010	12.1.2015	TVG	19:26	38°49.979	27°30.004	981	very young pillow fragments, extremely gas rich
	011	12.1.2015	TVG	21:07	38°47.472	27°26.911	120	very hard shallow surface, scoria samples with large glass pieces
	012	12.1.2015	TVG	22:24	38°47.806	27°29.521	521	massive TV grab with exclusively glassy and highly vesicular pillow lavas
	013	13.1.2015	TVG	00:24	38°46.056	27°24.662	314	Sediments recovered that may largely originate from Terceira island, sediments were embedded in relatively young lava flows
	014	13.1.2015	TVG	01:53	38°46.529	27°25.920	359	glassy scoria recovered
	015	13.1.2015	TVG	14:30	39°12.957	28°29.992	885	no samples taken, technical TV grab failure
	016	13.1.2015	TVG	17:30	39°12.955	28°29.994	885	no samples taken, ground too hard for TV grab
	017	13.1.2015	VSR	17:56	39°12.955	28°29.995	889	unconsolidated sand, potentially with glass clasts
	018	13.1.2015	TVG	20:40	39°08.099	28°12.752	657	one large carbonate crust and sand potentially with glassy clasts
	020	18.1.2015	TVG	14:38	38°34.886	29°9.792	913	corals, sand and carbonates
	021	18.1.2015	TVG	16:58	38°35.115	29°8.292	1037	numerous corals but several

								pieces of basalt
022		18.1.2015	TVG	21:05	38°36.928	28°51.834	181	few scoria pieces on side of grab
023		18.1.2015	VSR	23:11	38°36.895	28°51.809	186	VCR did not touch ground although cable was 10 m in excess of waterdepth
024		18.1.2015	VSR	23:54	38°36.809	28°52.195	278	few glassy grains and sediments
025		19.1.2015	VSR	00:40	38°36.701	28°52.898	304	glassy volcanic material
026		19.1.2015	TVG	02:27	38°35.598	28°52.255	449	Scoria and basalts with glassy material
027		19.1.2015	TVG	14:05	38°15.603	26°40.105	1018	empty grab
028		19.1.2015	TVG	15:22	38°15.60	26°40.10	1014	consisting of at least 10 different rock lithologies
029		19.1.2015	TVG	19:46	38°16.811	26°37.305	1016	grab was full of volcanic glass
030		19.1.2015	TVG	22:38	38°16.637	26°53.18	683	few corals and carbonate pieces
031		20.1.2015	TVG	06:56	38°59.770	27°29.75	1725	entire grab full of deep sea clay

TVG=TV-Greifer

VSR=Vulkanit-Stoßrohr